Arkwood, Inc., Superfund Site
Omaha, Arkansas
July 1990

PROPOSED PLAN OF ACTION

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the EPA preferred option for addressing the contamination problems at the Arkwood, Inc., site in Omaha, Arkansas. In addition, the Plan includes summaries of other alternatives analyzed for this site. EPA will select a remedy for Arkwood after the information submitted during the public comment period has been reviewed and considered during the decision-making process.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under the **Superfund Law, Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended.** This document summarizes information that can be found in greater detail in the Remedial Investigation, the Endangerment Assessment, Treatability Study, Feasibility Study and other documents in the Administrative Record file for the Arkwood site. EPA encourages the public to review these documents in order to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted. Documents are available for review during normal business hours at the Dallas EPA office, and:

Arkansas Department of
Pollution Control and Ecology
8001 National
Little Rock, Arkansas

Boone County Library
221 West Stephenson Avenue
Harrison, Arkansas

Boone County Courthouse
County Clerk's Office
Harrison, Arkansas

Omaha Public School
Library
Omaha, Arkansas

Mark Your Calendars

An Open House is scheduled on July 16, 1990, from 5–7 p.m. at the Omaha Public School to informally discuss any questions you might have on the Proposed Plan and the other alternatives. The public is invited to comment on the remedial alternatives described in the Feasibility Study, on the Proposed Plan of Action and on the Administrative Record. The Administrative Record contains all of the information used by EPA to date to propose the remedy and is available at the Omaha Public School. The public comment period begins on July 16, 1990, and ends August 15, 1990. During the public comment period, written comments may be submitted to:

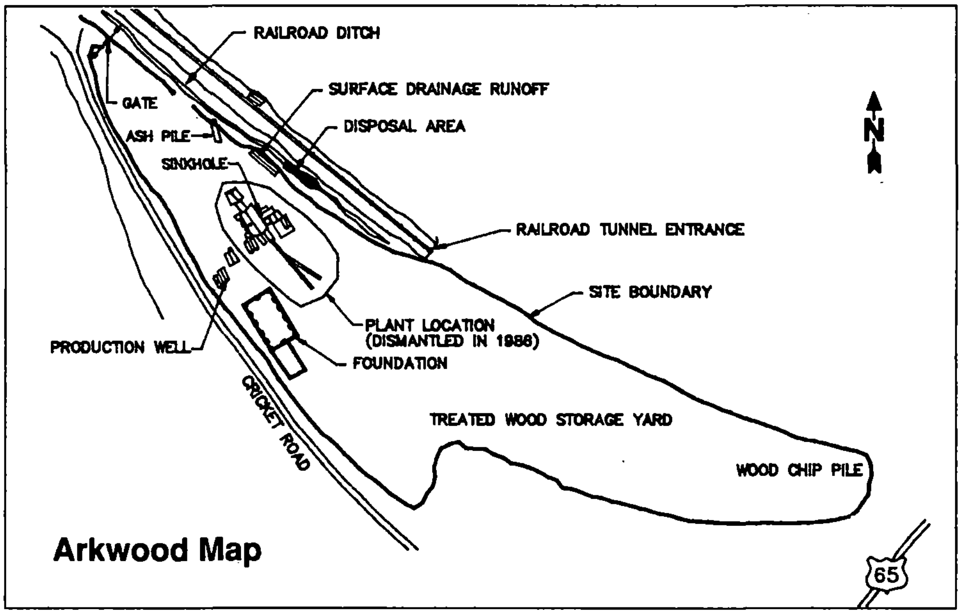
Ms. Ellen Greeney
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

(Words in bold are defined in the glossary insert)

THE PURPOSE OF THIS PROPOSED PLAN IS TO:

- Identify the preferred alternative for remedial action at the site and explain the reasons for the preference;
- Describe the other remedial options considered in detail in the Feasibility Study;
- Solicit public review of and comment on all the alternatives described in the Feasibility Study and information contained in the Administrative Record; and,
- Provide information on how the public can be involved in the remedy selection process.

Additionally, oral comments will be accepted at a public meeting which will be held on July 25, 1990, at the Omaha Public School starting at 7:00 p.m. EPA will respond to all comments in a document called a **Responsiveness Summary** which is mailed to everyone who comments in writing or at the public meeting. The Responsiveness Summary will also be attached to the **Record of Decision** and will be made available to the public in the information repositories. The Record of Decision explains the final remedy selected to correct contamination problems at a Superfund site. The final remedy could be different from the preferred alternative, depending upon any new information EPA may receive and consider as a result of public comments.



Arkwood Map

INTRODUCTION

EPA has proposed a plan of action to correct contamination problems at the Arkwood site in Omaha, Arkansas. These actions include incinerating the contaminated site soils onsite, covering any remaining contamination with topsoil, conducting a dye tracing study to further define local ground water flow direction from the site, placing nearby residents on municipal water and monitoring New Cricket Spring. The plan of action is being proposed following a comprehensive evaluation of several remedial alternatives. Remedial alternatives are technologies, administrative or legal actions, or other possible solutions for correcting contamination problems at Superfund sites. The remedial alternatives considered for Arkwood are described in detail in the Feasibility Study report. This Proposed Plan of Action summarizes the preferred alternative as well as other remedial alternatives that were considered in the Feasibility Study.

HISTORY OF THE ARKWOOD SITE

The Arkwood site is located west of U.S. Highway 65 and one-half mile southwest of Omaha, in Boone County, Arkansas. The site is located on an excavated area at the head of a valley and encompasses approximately 15 acres. The branch line of the Missouri Pacific Railroad borders the northeastern limit of the property. The southern and western limits are bounded by Cricket Road. Highway 65 forms the eastern property boundary.

The Arkwood site was originally excavated by the railroad to obtain material for the construction of railroad embankments. In 1962, Arkwood, Inc., opened a single-cylinder **pentachlorophenol (PCP)** and **creosote** wood treatment facility and operated the plant until 1973. From 1973 to 1984, Mass Merchandisers, Inc., (MMI) operated the plant under a lease agreement with the owner. MMI ceased operations in 1984 and sold or removed its remaining inventory and materials prior to the expiration of its lease in 1985. The owner subsequently dismantled the plant in 1986.

In 1981, the Arkansas Department of Pollution Control and Ecology (ADPC&E) received a complaint from a railroad worker about contaminated water in the railroad tunnel that runs under and alongside the site; the complaint indicated that the water smelled bad and caused eyes to burn. In response to the railroad worker's complaint, representatives from the ADPC&E and the Arkansas Department of Health inspected the Arkwood site in May 1981. Subsequent preliminary investigations indicated detectable levels of PCP in **ground water** in the immediate area surrounding the site.

In October 1981, MMI and ADPC&E representatives met to develop a plan of study that would address the following: (1) the limits of the problem area; (2) a plan of corrective action; and (3) a schedule of action for implementing corrective measures. The plan was submitted to the ADPC&E later that year.

In May 1982, MMI began monthly ground and surface water sampling of area springs. MMI changed its standard operating procedures to control the release of wood treating chemicals at the site. MMI also poured a concrete pad over a sinkhole where the former owner had dumped used wood treating materials, constructed a pad in front of the treatment cylinder, and graded the area around the pad to stop rainfall runoff from flooding the process area. MMI continued the monthly ground and surface water sampling program until December 1984.

In 1985, EPA proposed that the site be added to the **National Priorities List** (NPL), and the site was formally added to the NPL on March 31, 1989. In May 1985, MMI entered into an **Administrative Order on Consent** (Consent Order) with EPA. A **Remedial Investigation and Feasibility Study (RI/FS)** Work Plan was prepared in compliance with the Consent Order and finalized in December 1986. Due to problems in gaining site access, the RI/FS was not officially started until January 1988.

In August 1987, the owners of the site and MMI were served with an Administrative Order from EPA to control site access and to post warning signs at the site. The owners of the site complied with the order.

REMEDIAL INVESTIGATION AND FEASIBILITY STUDIES

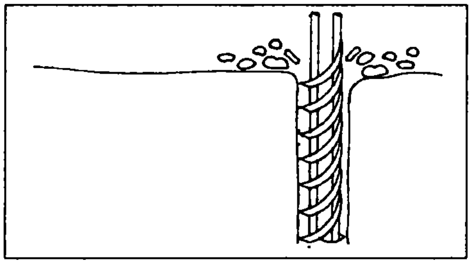
In 1985, with EPA oversight, MMI began a remedial investigation of the site to define the types and extent of contamination at the Arkwood site. The investigation involved field sampling and testing of surface soil, subsurface soil, stream sediments, storm water, site runoff, and air at the site. Ground water wells were also installed to collect ground water samples. **Chlorinated dibenzodioxins/dibenzofurans**, pentachlorophenol (PCP) and **polynuclear aromatic hydrocarbons** (PAHs) were among the contaminants detected in surface and subsurface soil, while only PCP was detected in the ground water.

The studies at Arkwood have identified two principal threats: contaminated soil and contaminated shallow ground water. Contaminated soil was determined to be the principal threat at the site because of the threat of direct contact to people on the site and because of the soil's potential to contaminate the ground water.

The Remedial Investigation has demonstrated only one consistent location of affected surface water—New Cricket Spring. It is several hundred feet from the northwest tip of the site, where spring water emerges from a hillside and flows into a small creek adjacent to Cricket Road. PCP, at levels from 0.3 to 3.9 parts per million, has been observed in New Cricket Spring, while no PAHs or dioxin were detected. Although the Railroad Tunnel Spring was the source of the original worker complaint, only a single occurrence of PCP and no occurrences of PAHs or dioxin were reported there during the RI. One residential well, W-38, reportedly contained two organic compounds during the RI, but it was not confirmed by immediate follow-up testing and is strongly believed to be the result of field or laboratory contamination. Five subsequent samples collected from W-38 failed to confirm this occurrence and have not shown any evidence of contamination. No other springs or residential wells sampled in a 1.5-mile radius of the site during the RI have shown any trace of Arkwood contaminants.

The **karst** topography that prevails throughout the area prevents an accurate prediction of ground water behavior. The subsurface contains fractures, joints, fissures and solution channels in the limestone rocks under the site area. These rock formations contain a shallow **aquifer**. Water in this aquifer flows through the cracks and other conduits in the limestone, and its patterns of movement are difficult to predict.

Because of the complexity of aquifer flow in a karst terrain, routine methods for determining where contamination is spreading, such as ground water monitor wells and modeling, are of little practical use at the Arkwood site. The geology of the area also prevents the use of traditional ground



water remediation techniques such as pumping and treating. For these reasons, a **dye tracing** study has been initiated in the site area. A dye tracing study will determine as accurately as possible where the ground water goes after it leaves the site. This study should be completed this summer. The results will be used to evaluate the remedial alternative for the ground water and will be used in the design phase to ensure public health is protected. While the results of this study will not be available before a decision is made on this Proposed Plan of Action, the study results will be used to assess any additional action on the ground water that may be necessary.

SUMMARY OF SITE RISKS

The national risk of getting some form of cancer over a 70-year life span is very high, estimated at 0.300 or a chance of 3-in-10. The 3-in-10 probability is considered the baseline situation or "natural incidence" of cancer. A 1-in-1000 risk is an increment above the 0.300 baseline risk (an increase from 0.300 to 0.301). The additional risk considered acceptable for remediated Superfund sites is in the range of 1×10^{-4} to 1×10^{-6}, which is shorthand for 1-in-10,000 to 1-in-1,000,000. EPA's goal, where possible, is to remediate a site so that any remaining contaminants pose a 1-in-1,000,000 increased risk to be protective of public health and the environment. Increased risks after remediation are allowed, depending on site-specific circumstances.

Exposure to site contaminants was determined possible through eating **affected soils**, drinking affected surface and ground water and through skin contact with affected soil and water. Exposure to affected water can result in exposure to PCP, while exposure to affected soils can result in exposure to PCP, PAHs and dioxins.

Three exposure scenarios were developed in the Endangerment Assessment. Exposure Scenario I reflects current site conditions with exposure only to affected soil in the railroad ditch by the public and by railroad personnel. The remainder of the site is fenced and inaccessible to the public. Exposure Scenario II reflects the most probable future use, that of people visiting the main site and railroad ditch moderately often. Exposure Scenario III reflects the worst case where people are living on the site as is, resulting in the maximum exposure to site contamination.

The assumptions for each scenario are:

Exposure Scenario I: Exposure by visiting the site 6 times a year for railroad personnel and 12 times a year for adults of the general public.

Exposure Scenario II: Exposure 12 times a year for adults and 6 times a year by children (main site and railroad ditch); 12 times per year by adults to New Cricket Spring.

Exposure Scenario III: Living on the site resulting in daily exposure to affected soil and ground water by adults and children; 12 exposures per year by 6–12 year-old children to the railroad ditch; and daily exposure by adults to New Cricket Spring.

The Endangerment Assessment was completed in August 1989 and its results are summarized as follows:

1. There is no significant environmental impact evident at this time due to the PCP from New Cricket Spring.

2. The total increased cancer risk for the site under current site conditions (Scenario I), associated with the railroad ditch, is 2-in-100,000 for the general public and 5-in-1,000,000 for railroad personnel. Risk is higher for

the general public than for railroad personnel since it is assumed that the public visits the site more frequently and for a longer period of time. The majority of site risks are due to the dioxin at the site.

3. Under the most probable future land use conditions (Exposure Scenario II), the total increased cancer risk for the main site is 1-in-100,000. The risks associated with the railroad ditch are the same as under current conditions (Exposure Scenario I).

4. Cancer risks are highest in the worst-case residential scenario (Exposure Scenario III). The cancer risk of the main site is 6-in-10,000. For the railroad ditch, risk to the general public is estimated at 3-in-100,000. The estimated cancer risk for railroad personnel is the same for all three exposure scenarios (see No. 2).

5. The risk assessment for New Cricket Spring indicates that no adverse effects from exposure to PCP in spring water are expected under any of the three exposure scenarios. This is because PCP is not considered to cause cancer and because the PCP at levels found in New Cricket Spring should not cause ill effects if the water is used for drinking.

Since the Endangerment Assessment was completed, EPA has changed its policy on how dioxins are considered in Endangerment Assessments. This change has caused the calculated risks to increase from those in the Endangerment Assessment. EPA has re-calculated the site risks to include the policy changes and the results are summarized as follows:

a. Under currect conditions (Exposure Scenario I), the increased risk associated with the railroad ditch is 2-in-10,000 for the general public and 7.5-in-100,000 for railroad personnel.

b. Under the most probable future land use conditions (Exposure Scenario II), the total increased cancer risk for the entire site is 1-in-10,000. The risks associated with the railroad ditch are the same as current conditions (Exposure Scenario I).

c. Under the worst case residential scenario (Exposure Scenario III), the cancer risk of the main site is 5-in-1,000. For the railroad ditch, risk to the general public is 5-in-100,000. The estimated cancer risk for railroad personnel is the same for all three scenarios.

SUMMARY OF ALTERNATIVES

Except for the "No Action" alternative, all alternatives now being considered would include a number of common elements and ground water monitoring for at least 30 years. These monitoring activities will be conducted to ensure that the remedy is effective. In addition, a notice will be placed in the site deed to prohibit certain activities such as constructing residential buildings at the site. The common elements are:

FENCING

A 6-foot chain-link fence would be installed around the site perimeter to control public access.

DECONTAMINATE AND REMOVE EXISTING STRUCTURES

Several existing structures and other miscellaneous materials will be dismantled, decontaminated and sent for disposal either onsite or at an off-site municipal landfill. This action is included in all alternatives except A (No Action) and B (Monitor Site and Restrict Access). These structures and materials include:

- The concrete slab covering the sinkhole
- Other visible foundations
- A storage tank
- Debarking shed
- Miscellaneous trash and debris.

Visible concrete slabs and foundations will be removed, decontaminated by steam cleaning until no visible oil or chemicals remain, broken into pieces of manageable size and transported to a municipal landfill. The water collected from steam cleaning will be analyzed and treated through a carbon filtration unit (described later) if the contaminant concentration exceeds acceptable levels. The storage tank and building will be dismantled, decontaminated and disposed of in the same manner.

Miscellaneous trash and debris will be either disposed of at a municipal landfill, placed under the cap, landfilled onsite or incinerated with the affected soils.

GROUND WATER MONITORING

Ground water monitoring will be performed for at least 30 years in all alternatives. Ground water monitoring will be conducted twice a year for the first 5 years and yearly for at least 25 years following the completion of the remediation. Ground water samples will be analyzed for PCP, the only site contaminant found in the ground water. Six locations will be monitored:

- New Cricket Spring
- Cricket Spring
- Railroad tunnel springs
- Well W-9 (Letherman)
- Well W-11A (new Birmingham)
- Well W-11B (old Birmingham)

Monitoring at these locations is expected to detect any off-site migration of PCP after the remediation of the Arkwood site. Pending the results of the dye tracing study, the sampling locations and frequency could change.

The descriptions of remedial alternatives are separated into two categories: soil contamination and ground water contamination.

SOIL CONTAMINATION REMEDIAL ALTERNATIVES

The remedial objectives for the soil are to prevent current or future direct contact to the contaminated soil through treatment and/or containment and to reduce the movement of contaminants from the soil to the ground water, also through treatment and/or containment.

Alternative A:

NO ACTION

This alternative would leave the site in its current condition and provide monitoring to detect any impact on ground water for thirty years. This alternative is not preferred by EPA but is used as a baseline alternative because it is required by the Superfund law.

Cost: $290,000

Alternative B:

MONITOR SITE AND RESTRICT ACCESS

Site access is controlled by completely fencing the site perimeter and by placing a notice in the property deed prohibiting residential construction on the site. Monitoring to detect any impact on ground water would be performed for thirty years. EPA does not consider this alternative acceptable because it does nothing to reduce the amount of contamination onsite.

Time Period: 4 months
Cost: $400,000

Alternative C:

INCINERATE SLUDGES ONLY

The railroad ditch and sinkhole sludges are excavated, shipped in bulk, and incinerated off-site. Cover soils from the railroad ditch (i.e., clean soils above the sludge) are backfilled into the excavation. Sinkhole water along with equipment decontamination water and any affected storm water is treated onsite through a carbon filtration unit, and discharged to the Cricket Road roadside ditch. The site is then fenced to control access, and existing structures are removed. While a large portion of site contaminants are destroyed, contaminated soils in the main site area would continue to pose an unacceptable increased risk to people on the site. EPA does not consider this alternative acceptable because of the increased risk posed by the site.

Construction Period: 6 months
Cost: $2.1 million

Alternative C1:

INCINERATE SLUDGES/CAP ENTIRE SITE WITH TOPSOIL

The railroad ditch and sinkhole sludges are excavated, shipped in bulk, and incinerated off-site. The soils covering the railroad ditch are backfilled into the excavation. Sinkhole fluids along with equipment decontamination water and any affected storm water are treated onsite in a wastewater carbon filter. The entire site is covered with a topsoil cap. The site is fenced to control access, and existing structures are removed. This alternative would eliminate the danger of skin contact with the site soils. However, it does not eliminate the threat to ground water, and has an unacceptably high probability of failure through erosion of the cap. EPA does not recommend this alternative.

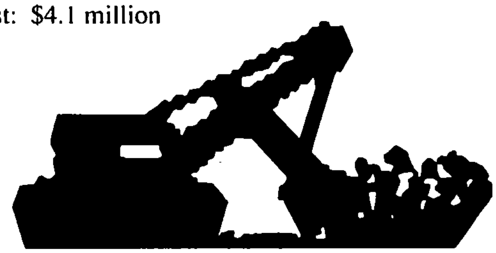
Construction Period: 6 months
Cost: $3.1 million

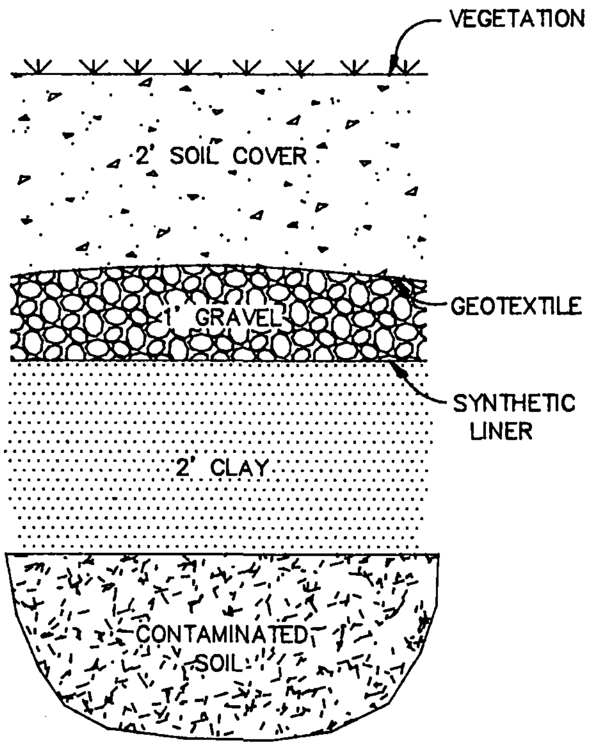
Alternative D:

INCINERATE SLUDGES/CONSOLIDATE AND CAP-IN-PLACE AFFECTED SOILS

As with Alternative C, existing structures are removed and the railroad ditch and sinkhole sludges are incinerated off-site. Sinkhole fluids, decontamination water and any affected storm water are treated in an onsite carbon filtration unit and discharged into the Cricket Road roadside ditch. Approximately 14,400 cubic yards of affected soils are excavated, consolidated and placed over the remaining affected soils. This includes affected soil from the railroad ditch which is not incinerated. The consolidated soils are covered with a **composite cap** designed to stop rainwater from entering the contaminated soils, unlike the topsoil cap. The remainder of the site, approximately 12 acres, is covered with a topsoil cap. The effectiveness of the composite cap will be tracked by the Cricket Spring monitoring program. While the composite cap should prevent the remaining contaminants from leaching into the ground water, the karstic geologic environment presents a possibility of a sinkhole forming under the capped waste. If this were to happen, the contaminated waste placed under the cap would go directly into the ground water. The possibility of catastrophic failure of the remedy is unacceptable to EPA; therefore, remedies that involve capping of untreated waste are unacceptable to EPA.

Construction Period: 1 year
Cost: $4.1 million





Composite Cap

Alternative E:

INCINERATE SLUDGES/CONSOLIDATE, SIEVE-AND-WASH AND CAP-IN-PLACE AFFECTED SOILS

As with Alternative D, the site is fenced, existing structures are removed and the railroad ditch and sinkhole sludges are incinerated off-site. All of the affected soils, approximately 20,400 cubic yards, are excavated, sieved, washed and tested to determine if they meet the health-based soil treatment goal. Soil with PCP, PAH and dioxin concentrations below the treatment goal are considered clean; clean soils are air dried and replaced onsite. Soil with PCP, PAH or dioxin concentrations exceeding the treatment goal are either treated again, or dried, consolidated and placed under a composite cap. The site is then covered with a topsoil cap. A wash water treatment unit is provided in this alternative to dewater the sand and fines after the sieve-and-wash process and to treat the wash water for re-use in the wash cycle. Sinkhole fluids, decontamination water and affected storm water are treated with the spent sieve-and-wash water. Upon completion of the project, treated wash water will ultimately be discharged into the ditch along Cricket Road. This alternative leaves contaminants onsite under a composite cap. In view of the uncertainties associated with the karst geology, and the possibility of catastrophic failure of the remedy, EPA does not prefer this remedy.

Construction and Operating Period: 2 years
Cost: $6.6 million

Alternative F:

INCINERATE SLUDGES/SIEVE-AND-WASH, BIOLOGICALLY TREAT SAND/FINES AND CAP-IN-PLACE AFFECTED SOILS

In Alternative F, the site is fenced, existing structures are removed and the railroad ditch and sinkhole sludges are incinerated off-site. The affected soils are excavated and treated by sieving and washing, which will result in two fractions of material, a coarse fraction and a sands and fines fraction. The sieve and wash is followed by **biological treatment** of the sand/fines fraction. Alternative F destroys contaminants of concern in the sand/fines fraction by biological treatment. The coarse fraction would be tested to determine if the wash achieves the treatment goal. The treated soils that achieve the treatment goal are backfilled onsite; the soils that do not achieve the treatment goal are dried, consolidated and placed under a composite cap onsite. The sinkhole fluids, equipment decontamination water and affected storm water are also treated in the biological treatment system. The site is then covered with a topsoil cap. While this alternative destroys most of the contamination found onsite, it is a very difficult alternative to implement. The difficulty in implementation, the uncertainty involved in the karst geology and the levels of contamination that the process would leave make this alternative unacceptable to EPA.

Construction Period: 1 year
Operating Period: 5 years
Cost: $14 million

Alternative G:

INCINERATE SLUDGES/LANDFILL AFFECTED SOILS ONSITE

Alternative G includes fencing the site, removing existing structures, incinerating the railroad ditch and sinkhole sludges off-site and placing the affected soils in an **onsite landfill**. Sinkhole fluids along with equipment decontamination water and affected storm water are treated onsite in a wastewater treatment unit. The site is then covered with a topsoil cap.

This alternative leaves the site contamination in a landfill that may fail due to the area geology, and through the erosion of the landfill cap. The remedy also does not treat the contaminated soils or reduce the volume or toxicity of the contaminated soils. EPA does not prefer this alternative.

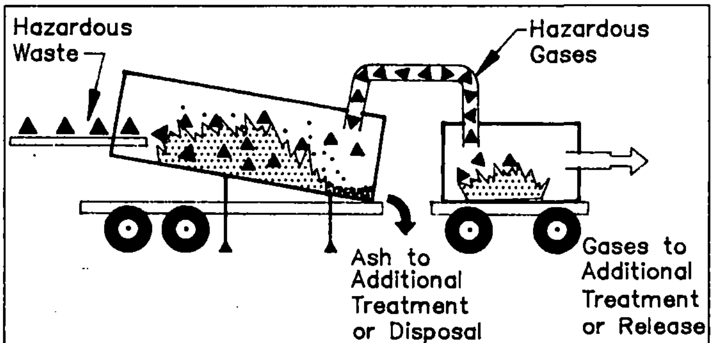
Construction Period: 2 years
Cost: $5.5 million

Alternative H:

INCINERATE SLUDGES AND AFFECTED SOILS ONSITE

All railroad ditch, sinkhole and site contaminated soils and sludges are excavated. An onsite incinerator with appropriate air pollution control devices is temporarily constructed onsite. Since the incinerator permanently destroys the contaminants of concern in both the site sludges and affected soils, EPA prefers this remedy because it destroys the site contamination and has a low possibility of failure.

Construction Period: 1 year
Operating Period: 2 years
Cost: $18 million



Mobile Incinerator

EVALUATION OF SOIL REMEDIAL ALTERNATIVES

This section describes the performance of the alternatives when measured against the evaluation criteria and discusses how they compare to the other alternatives in the plan. See page 11 for an explanation of the Evaluation Criteria.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives A (No Action) and B (Monitor Site and Restrict Access) are not protective of human health and the environment relative to the other alternatives because they do not remove or destroy the site contaminants.

Alternatives C (Incinerate Sludges) and C1 (Incinerate Sludges/Cap Entire Site With Topsoil) are protective of human health and the environment because the sludges are destroyed. Alternative C1 provides additional protection by providing a topsoil cap that eliminates the increased risk due to direct exposure. However, due to the uncertainty of leaving such high levels of contaminants in place above the site's karst geology, these alternatives are not as protective as the other alternatives that include permanent treatment of the site contaminants.

Alternatives D (Incinerate Sludges/Consolidate and Cap-in-Place Affected Soils) and G (Incinerate Sludges/Landfill Affected Soils Onsite) include containment of affected soils as well as incineration of the sludges. The containment of the soils reduces the possibility of contact, which reduces the risk from the site. The reduced risk provides better protection of human health and the environment than the preceding alternatives. However, because high levels of contaminants would remain in place, a large degree of uncertainty remains.

Alternatives E (Incinerate Sludges/Consolidate, Sieve-and-Wash and Cap-in-Place Affected Soils), F (Incinerate Sludges/Consolidate, Sieve-and-Wash, Biologically Treat Sand/Fines and Cap-in-Place Affected Soils) and H (Incinerate Sludges and Affected Soils Onsite) further reduce the excess risk. Alternative E permanently destroys more contaminants than Alternative D and, therefore, is more protective. Alternative F provides even more treatment as does Alternative H. Therefore, Alternative F is more protective than Alternative E, and Alternative H is more protective than Alternative F.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Alternatives A (No Action) and B (Monitor Site and Restrict Access) do not reduce the mobility, toxicity or volume as preferred by CERCLA. All of the other alternatives meet this preference in varying degrees. All of the alternatives except A and B will meet the state standard for water discharge.

LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives A (No Action) and B (Monitor Site and Restrict Access) are rated low, since neither alternative provides any certainty of long-term protection. The magnitude of the increased risk from the site is unchanged in either alternative.

Alternatives C (Incinerate Sludges) and C1 (Incinerate Sludges/Cap Entire Site With Topsoil) meet this criteria. By incinerating the sludges, both alternatives effectively remediate the worst contamination at the site; however, these alternatives may not protect ground water in the long-term.

Alternatives D (Incinerate Sludges/Consolidate and Cap-in-Place Affected Soils) and G (Incinerate Sludges/Landfill Affected Soils Onsite), provide a decrease in excess risk and afford a greater certainty of long-term success than the preceding alternatives due to treatment and/or containment of the affected soils. However, the remaining contaminants represent a significant degree of uncertainty regarding long-term protection of ground water.

Alternatives E (Incinerate Sludges/Consolidate, Sieve-and-Wash and Cap-in-Place Affected Soils), F (Incinerate Sludges/Consolidate, Sieve-and-Wash, Biologically Treat Sand/Fines and Cap-in-Place Affected Soils) and H (Incinerate Sludges and Affected Soils

Onsite) provide the maximum treatment for contaminants of concern. The magnitude of the remaining risk and the potential for exposure of humans and the environment to remaining contaminants are minimized in all of these alternatives. Alternative H is the most effective in the long-term.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

Alternatives A (No Action) and B (Monitor Site and Restrict Access) are rated low since neither decreases the toxicity, mobility or volume of contaminants at the site.

Alternatives C (Incinerate Sludges) and C1 (Incinerate Sludges/Cap Entire Site With Topsoil) reduce the toxicity, mobility and volume of contaminants via sludge incineration.

Alternatives D (Incinerate Sludges/Consolidate and Cap-in-Place Affected Soils) and G (Incinerate Sludges/Landfill Affected Soils Onsite) provide additional reduction of mobility through containment of the site contaminants by providing a composite cap over the contaminated soil or by landfilling the contaminated soil.

Alternatives E (Incinerate Sludges/Consolidate, Sieve-and-Wash and Cap-in-Place Affected Soils), F (Incinerate Sludges/Consolidate, Sieve-and-Wash, Biologically Treat Sand/Fines and Cap-in-Place Affected Soils) and H (Incinerate Sludges and Affected Soils Onsite) achieve additional reduction of toxicity, mobility and volume of site contaminants over Alternatives C1, D and G. In Alternatives E, F and H, the contaminants of concern are degraded or destroyed in varying degrees. Alternative H is the most effective at reducing the toxicity, mobility and volume.

SHORT-TERM EFFECTIVENESS

Alternatives A (No Action) and B (Site Monitoring and Restricted Access) are rated low since neither alternative reduces the short-term risk.

Alternatives C (Incinerate Sludges), F (Incinerate Sludges/Consolidate, Sieve-and-Wash, Biologically Treat Sand/Fines and Cap-in-Place Affected Soils) and H (Incinerate Sludges and Affected Soils Onsite) treat site contaminants via removal and incineration of the sludges. Alternatives F and H include additional treatment, but pose a small potential risk to workers and the environment during construction and operation periods of up to six years. During construction and operation of Alternatives F and H, workers will be exposed to affected soils because increased handling of the soil is required. For this reason, Alternatives F and H are less effective in the short-term than Alternative C.

Alternative E (Incinerate Sludges/Consolidate, Sieve-and-Wash, and Cap-in-Place Affected Soils) effectively remediates affected materials in a shorter time than Alternatives F and H (approximately one to one-and-one-half years). The construction and operation of less complex facilities pose less risk to workers and the environment. Less soil handling is required for Alternative E than for Alternative F. Treatment of affected soils in a relatively short time frame provides an improvement over Alternative C, which does not address the soils.

Alternatives C1 (Incinerate Sludges/Cap Entire Site With Topsoil), D (Incinerate Sludges/Consolidate and Cap-in-Place Affected Soils) and G (Incinerate Sludges/Landfill Affected Soils Onsite) are most effective in the short-term and are rated the highest. Construction activities for these alternatives are expected to be completed within two years, minimizing the short-term risk to workers, the community and the environment due to the handling of affected soil.

IMPLEMENTABILITY

Alternative H (Incinerate Sludges and Affected Soils Onsite) is a complex alternative to implement. Since the system operates at high temperatures, specialists in maintenance and operation are required. A trial burn (demonstration of performance) with associated analytical and reporting requirements is mandatory prior to operation; analytical and reporting requirements during operation are also more demanding than for other alternatives.

Alternative F (Incinerate Sludges/Consolidate, Sieve-and-Wash, Biologically Treat Sand/Fines and Cap-in-Place Affected Soils) is also more difficult to implement than the remaining alternatives. Although the biological treatment system is not overly difficult to design and construct, it requires more sophistication relative to the remaining alternatives, is difficult to operate and requires a long time period for operation.

Alternative E (Incinerate Sludges/Consolidate, Sieve-and-Wash, and Cap-in-Place Affected Soils) is less complex and requires less effort to implement than Alternatives F and H. The sieve-and-wash system is not well established and would require pilot testing. However, it consists of a few pieces of equipment which are well accepted in other, similar applications and are readily available from several manufacturers. The sieve-and-wash system is designed conceptually to have enough flexibility to be reliable in this application. Therefore, it is more easily implemented than Alternatives F and H

Alternative G (Incinerate Sludges/Landfill Affected Soils Onsite) is less complex and requires less effort to implement than Alternative E. Design, construction and maintenance of landfills is a well-established technology, and experienced construction contractors are readily available.

Alternative D (Incinerate Sludges/Cap-in-Place Affected Soils) is easily implemented. This alternative requires minimal construction, operation and maintenance of facilities. Design and construction of a cap is a well-established technology, and experienced contractors are readily available.

Alternatives A (No Action) and B (Monitor Site and Restrict Access) do not require much effort. Therefore, these alternatives are the most easily implemented and are rated the highest.

Alternatives C (Incinerate Sludges) and C1 (Incinerate Sludges/Cap Entire Site With Topsoil) are the most easily implemented of the treatment alternatives and are rated the highest because they require only excavation and transportation of a modest volume of sludges and then capping. Minimal construction, operation and maintenance of facilities is required under Alternatives C and C1. The necessary equipment, specialists, transportation and disposal capacity are readily available.

COST

The costs of the alternatives are:

Alternative A	$ 290,000
Alternative B	$ 400,000
Alternative C	$ 2,100,000
Alternative C1	$ 3,100,000
Alternative D	$ 4,100,000
Alternative E	$ 6,600,000
Alternative F	$14,000,000
Alternative G	$ 5,500,000
Alternative H	$18,000,000

STATE ACCEPTANCE

The State of Arkansas has reviewed the Feasibility Study and will provide comments during or after the public comment period.

COMMUNITY ACCEPTANCE

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision.

SUMMARY OF THE PREFERRED SOIL REMEDIAL ALTERNATIVE

In summary, Alternative H, onsite incineration of the sludges and affected soils, is the alternative preferred by EPA. While it is the most expensive alternative and an incinerator is complex to operate, it is a proven technology that would substantially reduce the risks posed by the site through complete destruction of most site contaminants. It is the only alternative that provides long-term protection of the ground water. This alternative also would leave no contaminants onsite that pose an increased risk greater than 1-in-1,000,000 if the site is maintained and used only for industrial purposes: This alternative protects the public and the environment to the maximum extent possible.

GROUND WATER REMEDIAL ALTERNATIVES

The remedial objective for ground water is to restore the spring water to State water quality standards.

Alternative A:

NATURAL ATTENUATION WITH MONITORING

Alternative A lowers the levels of contaminants through naturally occurring physical, chemical and biological processes (attenuation). As discussed in the RI, natural attenuation appears to be occurring. This alternative also includes monitoring of New Cricket Spring, Cricket Spring and the railroad tunnel springs to ensure that natural attenuation is continuing to work effectively. In order to eliminate public concerns regarding offsite ground water, well water users immediately down Cricket Creek valley from the site will be provided with City water.

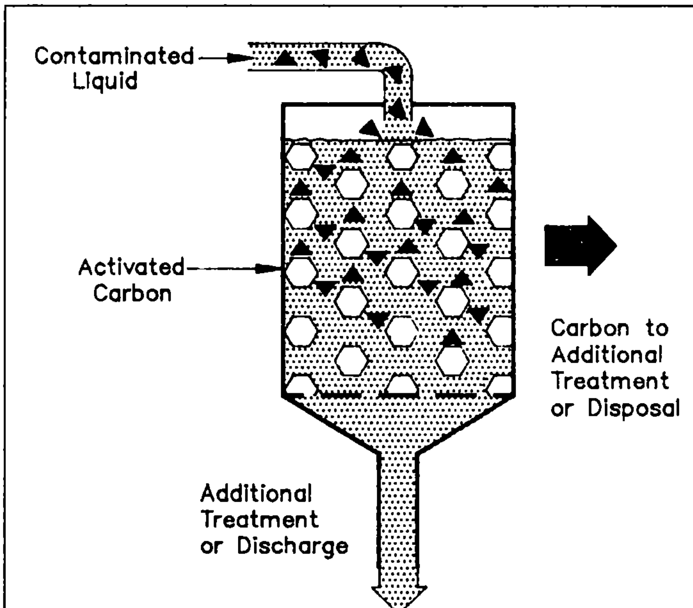
Cost: $150,000

Alternative B:

GROUND WATER RECOVERY/TREATMENT SURFACE DISCHARGE

Water would be recovered from New Cricket Spring, which is the only source of ground water shown to be affected by the site contaminants. After the water is collected, it would be filtered through a carbon filter to meet the applicable water quality standards, and discharged into the existing roadside ditch. The karstic nature of ground water flow in the site area makes it very difficult to use interceptor wells completed in the limestone. In order to eliminate public concerns regarding off-site ground water, ground water users immediately down Cricket Creek valley from the site will be provided with City water.

Cost: $4 million



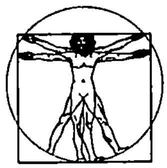
Carbon Adsorption

SELECTING A REMEDY

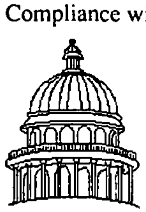
U.S. EPA uses nine criteria, or standards, to evaluate alternatives for addressing a hazardous waste site. The remedy ultimately selected for a site must meet all nine criteria. The nine criteria are as follows:

1 Overall Protection of Public Health and the Environment

This criterion addresses the way in which a potential remedy would reduce, eliminate, or control the risks posed by the site to human health and the environment. The methods used to achieve an adequate level of protection may be through engineering controls, treatment techniques, or other controls such as restrictions on the future use of the site. Total elimination of risk is often impossible to achieve. However, a remedy must minimize risk to assure that human health and the environment would be protected.



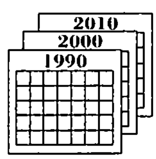
2 Compliance with ARARs



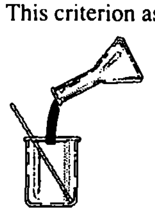
Compliance with ARARs, or "applicable or relevant and appropriate requirements," assures that a selected remedy will meet all related federal, state, and local requirements. The requirements may specify maximum concentrations of chemicals that can remain at a site; design or performance requirements for treatment technologies; and restrictions that may limit potential remedial activities at a site because of its location.

3 Long-Term Effectiveness or Permanence

This criterion addresses the ability of a potential option to reliably protect human health and the environment over time, after the cleanup goals have been accomplished.

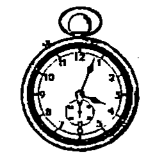


4 Reduction of Toxicity, Mobility, or Volume of Contaminants



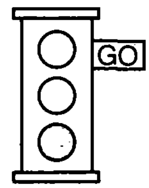
This criterion assesses how effectively a proposed remedy will address the contamination problem. Factors considered include the nature of the treatment process; the amount of hazardous materials that will be destroyed by the treatment process; how effectively the process reduces the toxicity, mobility, or volume of waste; and the type and quantity of contamination that will remain after treatment.

5 Short-Term Effectiveness



This criterion addresses the time factor. Remedies often require several years for implementation. A potential remedy is evaluated for the length of time required for implementation and the potential impact on human health and the environment during implementation.

6 Implementability

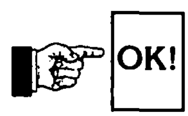


Implementability addresses the ease with which a potential remedy can be put in place. Factors such as availability of materials and services are considered.

7 Cost

Costs (including capital costs required for design and construction, and projected long-term maintenance costs) are considered and compared to the benefit that will result from implementing the remedy.

8 State Acceptance



The state has an opportunity to review the FS and Proposed Plan and offer comments to U.S. EPA. A state may agree with, oppose, or have no comment on the U.S. EPA preferred alternative.

9 Community Acceptance

During the public comment period, interested persons or organizations may comment on the potential remedies. U.S. EPA considers these comments in making its final selection. The comments are addressed in a document called a responsiveness summary, which is part of the record of decision for the site.

FINAL REMEDY

EVALUATION OF GROUND WATER REMEDIAL ALTERNATIVES

This section describes the performance of the alternatives when measured against the evaluation criteria and discusses how they compare to the other alternatives in the plan.

Overall Protection of Human Health and the Environment—Both alternatives will result in equivalent levels of protection since drinking water is not currently affected and, with either alternative, ground water concentrations protective of human health and the environment will result in the long-term.

Compliance With Applicable or Relevant and Appropriate Requirements (ARARs)—The primary ARAR for the New Cricket Spring is the State of Arkansas Regulation #2. This regulation sets standards for contaminant levels for water sources discharging into the surface waters of the state. Both alternatives will comply with this ARAR, although Alternative A may not achieve compliance for a long time period.

Long-term Effectiveness and Permanence—Both alternatives will result in concentrations protective of human health and the environment in the long-term.

Reduction of Toxicity, Mobility or Volume—Alternative A decreases the toxicity, mobility and volume of contaminants at the site through natural attenuation. Treatment is provided in Alternative B, and toxicity, mobility or volume of the contaminants in the ground water are decreased actively.

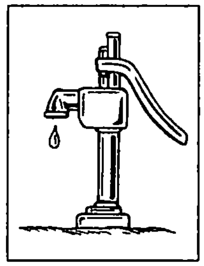
Short-term Effectiveness—Alternative A is short-term effective since ground water used for drinking is not affected and the water from New Cricket Spring is not adversely affecting human health or the environment. The spring concentrations will decline with natural attenuation. Water treatment in Alternative B will lower short-term PCP concentrations in the spring water, so it is rated higher.

Implementability—Alternative A does not include capital improvements or require much effort. This alternative is, therefore, more easily implemented. Alternative B includes construction, operation and maintenance of a fairly complex treatment facility. Therefore, B is rated lower for implementability.

Cost—The costs for the alternatives are as follows:

Alternative A	$ 150,000
Alternative B	$4,000,000

SUMMARY OF THE PREFERRED GROUND WATER ALTERNATIVE



The preferred alternative for remediating the ground water at the Arkwood site is a combination of Alternatives A and B. Following the remediation of the site by onsite incineration, New Cricket Spring will be monitored for two years to determine if natural attenuation is occurring. If natural attenuation has not reduced contaminant levels to acceptable levels, a treatment system would be installed, and the water treated to applicable levels. A dye tracing study also will be completed at the site, thus providing EPA with the information needed to assess the completeness of the monitored springs and wells network.

Based on current information, this alternative would appear to provide the best use of the possible alternatives available to EPA due to the geology of the site, and with respect to the seven criteria that EPA has used to evaluate these alternatives. The cost of the remedy will depend on whether treatment of the spring becomes necessary. Therefore the cost of the alternative is between $150,000 and $4,000,000.

EXPLANATION OF EVALUATION CRITERIA

Two assessments that are directly related to statutory determinations made in the Record of Decision are called the threshold criteria, and all alternatives must meet them. These two criteria are:

- Overall protection of human health and environment.
- Compliance with applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or grounds for invoking a waiver.

The five criteria listed below are grouped together because they represent the primary criteria upon which the analysis is based.

- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost, including capital and operation and maintenance costs.

The final two criteria, State Agency and Community Acceptance, will be evaluated following comment on the RI/FS Report and the Proposed Plan, and will be addressed once a final decision is made and the Record of Decision is prepared.

FOR MORE INFORMATION

EPA CONTACTS

If you have any questions, or need additional information, please write or call:

Brent Truskowski
Remedial Project Manager
U.S. EPA (6H-EA)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-6582

Ellen D. Greeney
Community Relations Coordinator
U.S. EPA (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-2240

News media inquiries should be directed to Roger Meacham, EPA Region 6 Press Officer, at (214) 655-2200.

ADMINISTRATIVE RECORD REPOSITORIES

The Administrative Record contains documents related to the Arkwood site. Anyone interested is encouraged to read the documents available at the repositories listed below:

Omaha Public School Library
Omaha, Arkansas

ADPC&E
8001 National Drive
Little Rock, Arkansas

U.S. EPA, Region 6
Library, 12th Floor
1445 Ross Avenue
Dallas, Texas 75202-2733

U.S. Environmental Protection Agency
Region 6 (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733

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GLOSSARY

Administrative Order on Consent. A legal and enforceable agreement signed between EPA and the potentially responsible parties (PRPs), whereby PRPs agree to perform or pay the cost of site studies. The agreement describes actions to be taken at a site.

Affected Soil. Site soils contaminated with greater than 300 parts per million PCP and 20 parts per billion dioxin (as 2,3,7,8 equivalents).

Aquifer. An underground rock formation composed of materials such as sand, soil, or gravel that can store and supply ground water to wells and springs.

Biological Treatment. A process where bacteria are used to destroy the contaminants. Nutrients (fertilizer) and oxygen are added to the soil in a bioreactor pond to enable the bacteria to rapidly destroy the contaminants.

Composite Cap. The composite cap is a combination design of (from top to bottom):

- Native grasses
- Topsoil
- Fill
- Geofabric
- Drainage layer
- Flexible membrane liner
- Recompacted clay.

It is constructed by placing and compacting the underlying affected materials, then placing and compacting three feet of clay. A flexible membrane liner is placed over the clay and covered by six inches of sand or gravel to drain rainwater from the cap. A geofabric is placed over the porous media to prevent the fill placed above from clogging the drainage layer. One foot of fill and six inches of seeded topsoil is then placed to provide native grasses to control erosion and to minimize the percolation of rainfall. This design requires very little maintenance. Annual mowing will keep trees or deep-rooted shrubs from penetrating the cap.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act. A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a trust fund, commonly known as Superfund, to investigate and remediate abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either:

- Pay for site work when the parties responsible for the contamination cannot be located or are unwilling or unable to perform the work.
- Take legal action to force the parties responsible for the site contamination to perform site work or pay back the government for the cost of the studies.

Creosote. A byproduct from the production of coke from coal. Creosote is a blend of the various coal tar distillates having specific physical characteristics that meet standards of the American Wood Preservers Association.

Dioxin, Chlorinated Dibenzodioxins/Dibenzofurans. A class of compounds referred to as dioxins and furans. There are 75 different dioxins and 135 different furans, which are typically reported in equivalent values to the most toxic 2,3,7,8 dioxin. It is inadvertently produced as an impurity of PCP. It is a probable cancer causing agent.

Dye Tracing. The practice of tracing ground water flow by adding distinctive substances (dye) to the water draining underground and monitoring the reappearance of the water and dye. In karst geology it is the most practical and satisfactory method to provide information on the rates and directions of ground water flow.

Ground Water. Water found beneath the Earth's surface that fills pores between soil, sand, and gravel particles to the point of saturation. When it occurs in a sufficient quantity, ground water can be used as a water supply.

Karst. An area of limestone formations characterized by sinks, ravines, and underground streams.

National Priorities List. U.S. EPA's list of the top priority hazardous waste sites in the United States that are eligible for investigation and remediation under Superfund. Sites on the National Priorities List are commonly referred to as "Superfund sites."

Onsite Landfill. An Onsite Landfill consists of an engineered, low permeability liner system and composite cap constructed for disposal of the affected soils. A well-designed landfill effectively controls the movement of contamination and provides a mechanism for detecting any leakage.

Pentachlorophenol (PCP). A common wood treating compound. It is a crystalline compound dissolved in fuel oil to be used as a wood preserving compound. PCP often contains chlorinated dibenzodioxins and dibenzofurans as impurities.

Polynuclear Aromatic Hydrocarbons (PAHs). A highly reactive group of natural organic compounds, some of which are known carcinogens. PAHs are commonly found in oil, natural gas, coal and creosote.

GLOSSARY CONTINUED

Record of Decision. A public document that explains which remedial alternative will be used at National Priorities List sites. The Record of Decision is based on information and technical analyses generated during the Remedial Investigation and Feasibility Study and consideration of public comments and community concerns.

Remedial Investigation and Feasibility Study. Two distinct but separate studies. They are usually performed at the same time, and are usually referred to as the "RI/FS." They are intended to:

- Gather the data necessary to determine the type and extent of contamination at a Superfund site;
- Establish criteria for remediating the site;
- Identify and screen remedial alternatives for remedial action; and
- Analyze in detail the technology and costs of the alternatives.

Responsiveness Summary. A summary of oral and written public comments received by EPA during a comment period on key EPA documents and EPA's responses to those comments. The responsiveness summary is especially valuable during the Record of Decision phase at a site on the National Priorities List when it highlights community concerns for EPA decision-makers.

Superfund. The common name used for the Comprehensive Environmental Response, Compensation, and Liability Act.

Topsoil Cap. A topsoil cap consists of 12 inches of topsoil seeded with native grasses; it can eliminate the risk of contact with affected soils.

Mailing List

If you do not receive material from U.S. EPA, and would like to be on the U.S. EPA mailing list for the Arkwood, Inc. site, please fill in your name and address and then fold, tape, stamp, and mail this form.

Name ____

Affiliation ____

Street Address ____

City ______________________________ State ________ Zip Code ____________

Daytime Phone (____) ____________________

Comments

U.S. EPA would like your comments on the feasibility studies, the Proposed Plan, and the Administrative Record for the Arkwood, Inc. site. Write your comments below, then fold, tape, stamp, and mail this form. All significant comments will be addressed in the Responsiveness Summary for the site. Written comments must be postmarked no later than August 15, 1990. If you would like a copy of the Responsiveness Summary, complete the name and address information above.

PLACE
STAMP
HERE

Ms. Ellen Greeney
Community Relations Coordinator
U.S. Environmental Protection Agency (6H-MC)
1445 Ross Avenue
Dallas, Texas 75202-2733